

Application Serial No: 09/814,487  
In reply to Office Action of 18 March 2005

Attorney Docket No. 80095

REMARKS / ARGUMENTS

At the outset, Applicants are pleased to note that the Examiner considers the subject matter of claims 7 and 16 to be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and amended to overcome the objections set forth in Examiner's Office action. Claims 1-7, 9, 10 and 14-16 are currently pending in the application. Claims 1-6, 9, 10, 14 and 15 are rejected. Claims 7 and 16 are objected to. Claims 1, 10, 14 and 16 are amended. Claims 17-24 are newly added claims. Claims 3, 6 and 7 are cancelled without prejudice.

The Examiner has objected to claims 1-8, 9, 10 and 14-16 because of the following informalities:

The Examiner states that in claim 1 that the jacket is concentric with the exterior of the core (see line 8). However, it is not clear from this limitation how the jacket is structurally related (placed) relative to the core, e.g., it is concentric and spaced from the exterior of the core, or is it concentric from the core and surrounding the armor wires that are located around the exterior of the core? As claimed, it appears that the jacket is spaced from the core and surrounding the armor wires that are located around the exterior of the core (see lines 9-10).

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The Examiner states claim 3 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim (see claim 1).

The Examiner states in claim 14, "which includes a" should be replaced with, e.g., --wherein the--, since the claims appears to be stating that there is a processing means in addition to the processing means of claim 1.

The Examiner states in claim 16, there is lack of antecedent basis in the disclosure for an optical fiber being enclosed in a steel tube and surrounded by a bundle of steel armor wires. The disclosure states that either the fiber is surrounded by a steel tube or is surrounded by a bundle of steel armor wires that are optionally encased by a KEVLAR™ sleeve (see page 5, lines 1-11 and 14-15; and page 6, lines 21-24 and 26).

The Examiner objected to claims 2, 4-8, 9, 10 and 15 for being dependent on an object base claim. The Examiner states appropriate correction is required.

The Examiner rejected claims 1-6, 9, 10, 14, and 15 under 35 U.S.C. 103(a) as being unpatentable over Yamaguchi et al. (U.S. Patent No. 5,198,662) in view of Holmberg (U.S. Patent No. 5,212,755).

The Examiner states that Yamaguchi discloses a system for measuring a temperature profile of a body of water using an

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optical fiber tow cable suspended into the body of water from a ship, and a measuring device for continuously measuring temperature at various points along the length of the cable. The cable (4) comprises a core (15) having optical fibers (14) therein and surrounded by steel armor wires (16). The measuring device used OTDR (see figure 5 and 6) and comprises a light source that transmits optical pulses of light into the fibers, a receiver that receives backscattered light (Raman scattering) from the fibers, processing means for analyzing the backscattering light to measure the temperatures of the water along the length of the cable and measure the temperature profile, and a display unit for generating a visual representation (figure 6) of the temperature profile data (see figures 1, 3, and 6; column 3, lines 34-68; and column 4, lines 1-12).

The Examiner states that Yamaguchi does not disclose the fiber optic tow cable comprising a core; a jacket concentric with the exterior of the core; a plurality of steel for KEVLAR<sup>TM</sup> armor wires radially spaced around the exterior of the core and defining at least one layer circumferentially concentric with the core; a plurality of optic fibers spaced around the exterior of the core interspersed among the armor wires in the outmost layer of the at least one layer of armor wires to expose the fibers to the temperature of a fluid; each of the plurality of

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fibers being enclosed in a steel tube; and a corresponding armor wire being replaced by the fiber in the steel tube, the steel tube having a diameter that is less than or equal to the diameter of the replaced armor wire.

The Examiner argues that Holmberg discloses a fiber optic tow cable comprising:

A core (22);

A jacket (24) concentric with the exterior of the core

A plurality of armor wires (26) radially spaced around the exterior of the core and defining one layer circumferentially concentric with the core; wherein the wires can be steel (16) or KEVLAR™ fibers (26); and

A plurality of optic fibers spaced around the exterior of the core interspersed among the armor wires (26) in the one layer of armor wires;

wherein each of the fibers are enclosed in steel tube (18), and a corresponding armor wire is replaced by the fiber in the steel tube, the steel tube having a diameter that is less than or equal to the diameter of the replaced armor wire (see column 2, lines 38-42). The cable is an improvement over prior art cables that have the fiber in the core since the optic fiber is placed outside of the core to reduce strain on the fiber, thereby improving the optical characteristics of the fiber (see

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figures 1 and 2; column 1, lines 15-63; column 2, line 52 -  
column 3, line 17).

The Examiner states that referring to claim 1, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the cable of Yamaguchi by replacing the tow cable with a tow cable as taught by Holmberg, in order to provide a cable having reduced strain on the fibers thereby obtaining improved temperature measurements.

The Examiner states that in claim 1 there is at least one layer of armor wires, i.e., one layer is present. However, Holmberg also discloses that there can be one layer of armor wires present, i.e., one or more, as stated in column 2, lines 18-19 and 64-65. Therefore, when only one layer is present in the cable of Holmberg, the fibers are considered to be placed in the "outer layer" since there is only one layer of armor wires present.

These rejections are respectfully traversed.

Yamaguchi appears to teach a measuring system measures temperature distribution in water using an optical fiber. An optical fiber cable suspended from a ship and towed by the ship to form an arch within the water. A measuring device for continuously measuring temperature at various points along the lengths of said optical fiber cable. Sensors are provided within the water to calculate the water depth at each of the

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various points along the length of the arch shaped optical fiber. Thus, a temperature distribution at each water depth can be continuously measured.

Holmberg teaches an armored fiber optic cable is disclosed having both fiber optics and armor wires located outside the cable core in position where the fiber optics experience low strain when the cable is under stress. In one embodiment, metal armor wires and optical fibers embedded in metal tubes are arrayed in one or more layers about the outside the cable core. In another embodiment, KEVLAR armor wires and optical fibers embedded within a hard composite shell are arrayed in one or more layers about the outside the cable core, and a layer of KEVLAR armor is provided surrounding the one or more layers. In each of the embodiments the strains that the fiber optics experience due to core stresses and due to core residual strain is materially reduced over the heretofore known armored fiber optic cables.

Applicants teach an integrated fiber-optic tow cable is described having both optical fibers and armor wires located outside the cable core to avoid high strain on the optical fibers when the cables is under stress during deployment. The optical fibers have integral temperature sensors near the outermost portion in order to measure accurately the temperature of the fluid coming in contact with temperature sensors. A beam of light

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is shown on the optical fibers and is reflected by the optical fibers and reaches the receiver and processed by the processor that may also include a display unit.

Applicants have amended claim 1 to clarify the structural relationship between the jacket and the core by stating that the jacket is "concentric with and in contact with the exterior of said core," in response to Examiner's objection.

Applicants have amended claim 1 to clarify the structural relationship between the jacket and the surrounding armor wires by teaching "a plurality of armor wires radially spaced around and in contact with the exterior of said ~~core~~ jacket and defining at least one radially located layer circumferentially concentric with said ~~core~~ jacket," in response to Examiner's objection.

Applicants have canceled claim 3 in response to Examiner's objection.

Applicants have amended claim 14 replacing "which includes a" with "wherein the" in response to Examiner's objection.

In response to Examiner's objection to claim 16, Applicants argue that FIG. 1 illustrates an optical fiber surrounded by a bundle of steel armor wires and enclosed in a steel tube, which provides sufficient antecedent basis for what is claimed in claim 16. However, applicants have amended the specification and claim 16 to conform with the information contained in FIG. 1 in accordance with MPEP 2163.06 ". . . information contained in any

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one of the specification, claims or drawings of the application as filed may be added to any other part of the application without introducing new matter." The amended specification describes what is illustrated in FIG. 1. In addition claim 16 is amended to depend from claim 1.

Applicants have added new dependant claim 17 to include the further limitation of "a KEVLAR™ braided fiber-based sleeve enclosing said plurality of steel armor wires of smaller diameter surrounding said optical fiber," as described in the disclosure.

Applicants have amended claim 1 such that the content of claim 1 now contains the subject matter of claim 7 rewritten in independent form including all of the limitations of the base claim and any intervening claims in strict compliance with the requirements of the Examiner. Having done this, Applicants have canceled claim 7. Applicants respectfully suggest that, in light of the amendment to claim 1, claim 1 should now be allowed. Applicants also suggest that claims 2, 4, 5, 9, 10, and 14-17 are now also allowable through dependency.

Applicants have added new independent claim 18 and dependant claims 19-24 in order to claim an embodiment of the present invention having the limitation of "a plurality of optical fibers surrounded by a plurality of KEVLAR™ armor wires having a smaller diameter than that of the plurality of armor wires," as described in the disclosure.



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Applicants respectfully suggest in view of these remarks that all grounds for rejection and objection have been removed by the foregoing amendments. Applicants state that no new matter has been added by this amendment, and that all of the remaining claims in the application are now believed to be in condition for allowance. Reconsideration and allowance of this application are therefore earnestly solicited.

The Examiner is invited to telephone Jean-Paul A. Nasser, Attorney for Applicants, at 401-832-4736 if, in the opinion of the Examiner, such a telephone call would serve to expedite the prosecution of the subject patent application.

Respectfully submitted,  
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